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AIR QUALITY ASSESSMENT
THUNDER BAY TERMINALS LIMITED
THUNDER BAY
1983



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Chief, Air Quality Assessment



TECHNICAL SUPPORT SECTION
NORTHWESTERN REGION
ONTARIO MINISTRY OF THE ENVIRONMENT

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INTRODUCTION

In 1978, Thunder Bay Terminals Limited opened a bulk storage and trans-shipment facility adjacent to Thunder Bay harbour. Air quality studies, both before and after operations started at the terminal, have shown that the handling of bulk materials (mainly coal) at this site has not caused any increase in dust levels off company property. In 1983, nearly 3 million tons of coal and 1 million tons of potash were received and shipped by Thunder Bay Terminals.

In 1983, dustfall and suspended particulate matter were measured both on and adjacent to Thunder Bay Terminals property. Wind was also monitored at the company's office near the coal storage areas.

AIR QUALITY DATA

DUSTFALL

Dustfall consists of particulate matter that settles out from the air by gravity. In 1983, dustfall was monitored at the six sites shown in Figure 1. Four of the six locations (sites 1, 3, 6 and 7) were maintained by Thunder Bay Terminals, while two (sites 9 and 10) were Ministry monitoring stations.

During 1983, monthly dustfall levels never exceeded Ontario's maximum acceptable limit of $7 \text{ g/m}^2/30 \text{ d}$ (grams per square metre during 30 days) at any of the three off-property monitoring sites (Table 1). Full compliance was also achieved with the annual objective ($4.6 \text{ g/m}^2/30 \text{ d}$) at the same locations. On company property (sites 3, 6 and 7), most of the elevated readings were caused not only by coal particles, but also by road dust and insect parts. The two highest readings, in July, resulted from unidentified soluble substance(s).

At the three off-property sites, there has been little variation in average annual dustfall from 1976 to 1983 (Table 2). If anything, dustfall at these locations was lower after the terminal began operating than before.

TOTAL SUSPENDED PARTICULATE MATTER (TSP)

Particles of suspended particulate matter are much smaller than dustfall particles and remain suspended in the air for long periods. TSP at Thunder Bay Terminals was measured for a 24-hour period every sixth day in 1983, using a standard high volume sampler. Table 3 summarizes the data for the year at three sites. At the two off-property locations (sites 1 and 10), compliance with the 24-hour TSP objective of $120 \mu\text{g}/\text{m}^3$ was fully achieved at site 10, and was met on all but one sampling date at site 1. Even at the on-property site (site 3), the objective was exceeded only four times. None of the exceedences was significant. The desirable annual limit ($60 \mu\text{g}/\text{m}^3$) was met at all monitoring locations, as it was in preceding years (Table 4).

CONCLUSION

Dustfall and suspended particulate matter near Thunder Bay Terminals property continued to be recorded at satisfactorily low levels in 1983. Monitoring will be continued to ensure compliance with Ontario air quality objectives.

ACKNOWLEDGEMENT

The Ministry thanks Thunder Bay Terminals Limited for data on wind measurements, dustfall, and suspended particulate matter from its monitoring network.

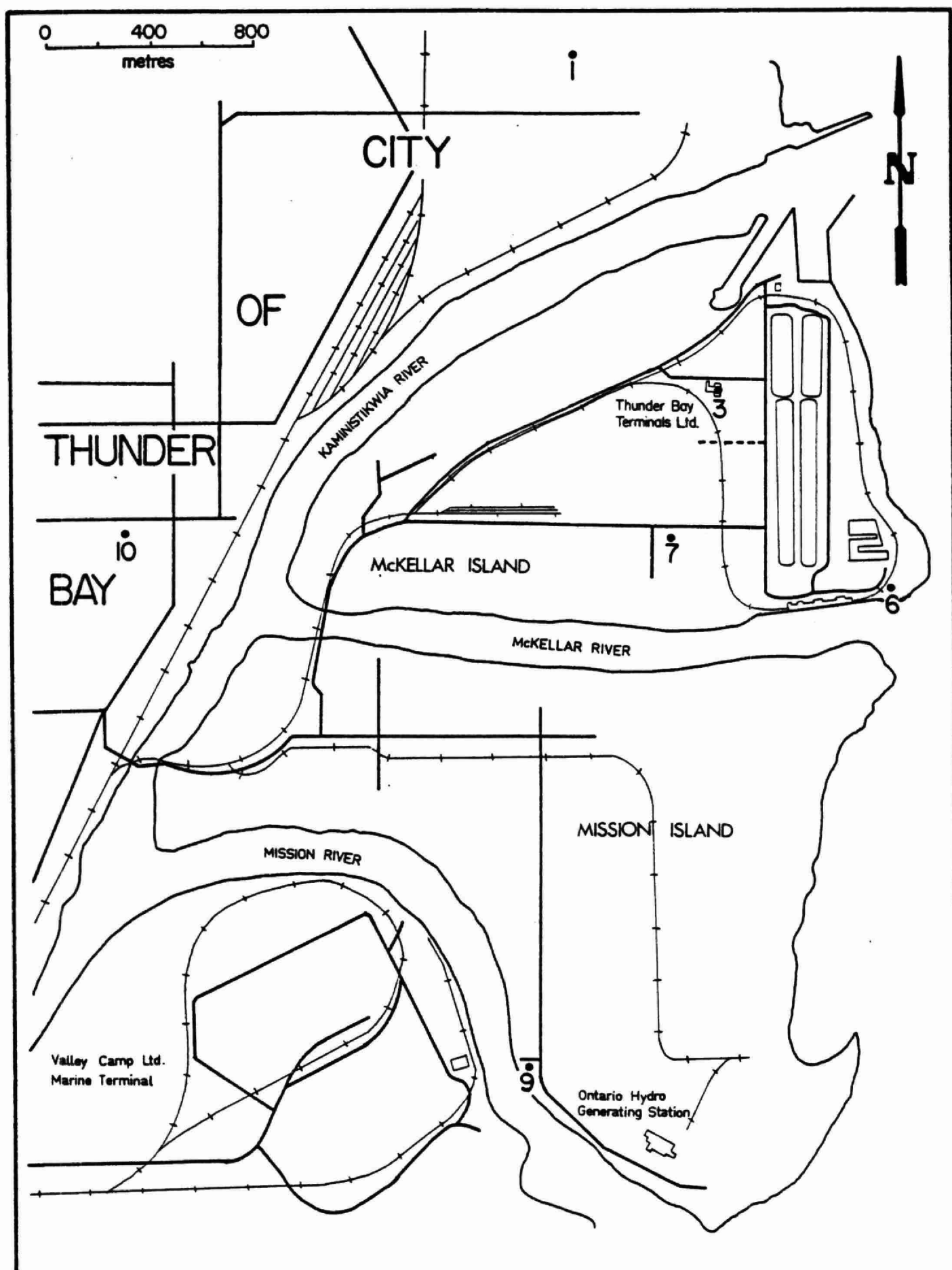


Figure 1. Air quality monitoring sites, 1983.

TABLE 1. Total dustfall (g/m²/30 days) near Thunder Bay Terminals Limited, 1983.

Site	Location	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Mean
1	Sewage Treatment Plant	1.7	3.3	4.7	2.2	1.8	7.0	5.7	4.7	3.5	1.8	1.9	2.4	3.4
3	Thunder Bay Terminals	1.1	3.7	4.3	<u>7.2^a</u>	4.0	<u>15.0</u>	<u>40.7</u>	<u>7.9</u>	3.9	3.0	5.4	2.9	<u>8.2</u>
6	Thunder Bay Terminals	0.9	7.0	4.3	<u>26.1</u>	<u>21.4</u>	<u>10.6</u>	<u>91.5</u>	<u>13.7</u>	<u>38.4</u>	4.5	2.9	<u>12.6</u>	<u>19.5</u>
7	Thunder Bay Terminals	1.3	5.0	4.8	6.1	5.5	6.1	<u>106.9</u>	-	<u>33.5</u>	2.1	3.1	2.5	<u>16.1</u>
9	Kam Boating Club	1.8	1.3	1.0	2.1	-	-	3.1	2.4	1.6	0.4	1.8	1.1	1.7
10	McKellar Hospital	1.9	3.7	4.0	6.5	-	-	3.6	3.9	1.9	1.8	2.4	1.5	3.1

^aValues exceeding maximum acceptable levels of 7.0 (monthly) or 4.6 (annual mean) are underlined.

TABLE 2. Average annual dustfall (g/m²/30 d) near Thunder Bay Terminals Limited, 1976-1983.

Monitoring site	Location	1976	1977	1978	1979	1980	1981	1982	1983
1	Sewage Treatment Plant	3.2	4.4	3.2	2.8	2.5	2.1	2.8	3.4
3	Thunder Bay Terminals	4.2	4.2	2.7	2.7	<u>5.2</u> ^a	3.6	<u>4.7</u>	<u>8.2</u>
6	Thunder Bay Terminals					<u>8.5</u>	<u>6.9</u>	<u>8.8</u>	<u>19.5</u>
7	Thunder Bay Terminals					<u>7.9</u>	4.3	3.2	<u>16.1</u>
9	Kam Boating Club	<u>5.6</u>	4.6	4.3	4.2	2.5	2.1	3.4	1.7
10	McKellar Hospital	3.5	<u>5.0</u>	3.8	3.8	4.0	3.7	3.8	3.1

^aValues above maximum acceptable level of 4.6 are underlined.

TABLE 3. Concentrations of total suspended particulate matter ($\mu\text{g}/\text{m}^3$) near Thunder Bay Terminals Limited, 1983.

Date	Monitoring sites			Date	Monitoring sites		
	1	3	10		1	3	10
Jan 6	21	25	24	Jul 5	39	26	24
12	43	41	47	11	75	74	82
18	49	62	58	17	30	55	35
24	13	15	19	23	41	46	-
30	7	9	9	29	41	36	43
Feb 5	27	27	19	Aug 4	4	21	48
11	12	20	30	10	12	23	17
17	20	19	29	16	52	85	47
23	10	17	22	22	21	32	21
Mar 1	29	43	47	28	39	98	29
7	-	16	14	Sep 3	56	60	65
13	65	<u>162^a</u>	53	9	28	27	33
19	35	<u>51</u>	91	15	29	15	38
25	69	<u>124</u>	-	21	16	17	17
31	42	<u>69</u>	-	27	61	95	51
Apr 6	15	45	77	Oct 3	16	26	30
12	18	47	57	9	29	33	30
18	66	78	89	15	22	28	26
24	40	47	-	21	62	-	49
30	42	38	38	27	9	80	90
May 6	29	90	62	Nov 2	42	<u>140</u>	63
12	46	<u>149</u>	98	8	33	<u>82</u>	47
18	22	<u>90</u>	<u>122</u>	14	76	84	-
24	7	32	<u>39</u>	20	11	14	11
30	12	18	24	26	20	49	23
Jun 5	20	20	21	Dec 2	28	56	-
11	41	62	58	8	30	22	24
17	37	40	54	14	24	50	15
23	33	68	39	20	37	46	38
29	36	64	51	26	20	48	18
Annual mean:					27	42	36

^aValues above the 24-hour objective ($120 \mu\text{g}/\text{m}^3$) are underlined.

TABLE 4. Annual geometric means ($\mu\text{g}/\text{m}^3$) of total suspended particulate matter near Thunder Bay Terminals Limited, 1976-1983.

Monitoring site	Location	1976	1977	1978	1979	1980	1981	1982	1983
1	Sewage Treatment Plant	41	31	27	30	28	31	28	27
3	Thunder Bay Terminals	47	33	34	33	33	39	32	42
10	McKellar Hospital	49	36	44	51	44	52	39	36

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